

CLAIMS

What is claimed is:

- 5 1. A method of forming an epitaxial film on a substrate, comprising the steps of:
 - (a) growing an initial layer of a film on a substrate at a temperature T_{growth} , said initial layer having a thickness h ;
 - (b) annealing the initial layer of the film at a temperature T_{anneal} , thereby substantially completely relaxing the initial layer.
- 10 2. The method of Claim 1 further including growing additional layers of the film over the initial layer subsequent to annealing.
- 15 3. The method of Claim 1 wherein said thickness h of the initial layer of the film is greater than a critical thickness h_c .
4. The method of Claim 1 wherein h between about 1 and about 5 monolayers.
- 20 5. The method of Claim 1 wherein T_{growth} is about equal to T_{anneal} .
6. The method of Claim 1 wherein T_{growth} is less than T_{anneal} .
- 25 7. The method of Claim 1 wherein growth of the initial layer includes two-dimensional growth.
8. The method of Claim 1 wherein the substrate includes Si(100) and the film includes TiN.

9. The method of Claim 1 wherein the substrate includes Si(111) and the film includes at least one III-nitride selected from the group consisting of AlN, GaInN, and AlGaInN.
- 5 10. The method of Claim 9 wherein the film includes AlN.
11. The method of Claim 1 wherein the substrate includes Al₂O₃(0001) and wherein the film includes at least one member selected from the group consisting of ZnO, AlN, GaInN, and AlGaInN.
- 10 12. The method of Claim 11 wherein the film includes ZnO.
13. The method of Claim 2 further including the step of growing a layer of the film that includes at least one amorphous area.
- 15 14. The method of Claim 14 wherein at least one amorphous area includes Si.
- 20 15. The method of Claim 14 wherein at least one area of amorphous growth includes silicone nitride or silicone oxide.